Parent Review Guide:  Chapter 7 Exponents and Logarithms

This guide will help you understand the math topics your student is learning. We'll keep it simple with clear explanations and easy examples.

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## 1. Converting Between Logarithms and Exponents

### Explanation

Logarithms and exponents are opposites. A logarithm answers the question:

"What power do I raise the base to in order to get this number?"

### How to Convert

• Exponential Form: $a^b = c$

• Logarithmic Form: $\log_a c = b$

## Example

### Convert between forms:

• Exponential: $3^2 = 9$

• Logarithmic: $\log_3 9 = 2$

This means 3 raised to the power of 2 equals 9.

### Key Vocabulary

• Base – The number being multiplied.

• Exponent – The number of times the base is multiplied by itself.

• Logarithm – The opposite of an exponent.

## 2. Change of Base Formula

### Explanation

Most calculators only work with base 10 (log or base e/ln). The change of base formula helps when we need a different base:

$$log_a b = \frac{logb}{loga}$$

You can use a calculator to find log values and divide them.

### Example

Find $log_2 8$:

$$log_2 8 = \frac{log8}{log2} = \frac{3}{1} = 3$$

This means $2^3 = 8$.

### Key Vocabulary

• Change of Base – A way to rewrite a logarithm using a different base.

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## 3. Logarithm Rules: Multiplication and Division

### Explanation

Logarithms follow simple rules:

• Multiplication (Product Rule):

$$\log_a(M * N) = log_a M + log_a N$$

(Multiplication turns into addition.)

• Division (Quotient Rule):

$$log_a\left(\frac{M}{N}\right) = log_a M - log_a N$$

(Division turns into subtraction.)

**Example**

Using base 10 logs:

• $log(10) + log(100) = log(1000) = 3$

• $log(100) - log(10) = log(10) = 1$

**Key Vocabulary**

• Product Rule – Log of multiplication becomes addition.

• Quotient Rule – Log of division becomes subtraction.

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## 4. Graphing Exponential and Logarithmic Functions

**Explanation**

When graphing exponentials or logarithms, we use:

• Two points to show the curve.

• An asymptote, which is a line the graph gets close to but never touches.

**Example**

For $y = 2^x$:

• If x = 0, then $y = 2^0 = 1$ (Point: (0,1))

• If x = 2, then $y = 2^2 = 4$ (Point: (2,4))

• The asymptote is the x-axis (y = 0) because the graph never goes below zero.

**Key Vocabulary**

• Asymptote – A boundary the graph never crosses.

## 5. Solving Word Problems with Exponential Functions

**Explanation**

We use exponential formulas to model things that grow or shrink over time, like money, population, or bacteria.

The formula is:

$y = a \cdot b^x$

• a – Starting amount

• b – Growth or decay factor

• x – Number of time periods

**Example**

A town has 200 people and doubles every 5 years. How many people will there be in 10 years?

$$y = 200 \times 2^{\left\{\frac{10}{5}\right\}}$$

$$y = 200 \times 2^2 = 200 \times 4 = 800$$

After 10 years, there will be 800 people.

**Key Vocabulary**

• Growth Rate – How fast something increases.

• Exponential Growth – When something gets bigger quickly.

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Final Tips for Parents

• Practice converting between logarithmic and exponential forms with simple numbers.

• Use graphing tools (like Desmos) to visualize exponential and logarithmic curves.

• Encourage real-world examples—talk about interest rates, bacteria growth, or even how viral videos spread!

Supporting your student in these topics will help them succeed in understanding exponents and logarithms!